



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,497	04/15/2004	Takeshi Endou	01-617	6579
23400	7590	08/09/2005	EXAMINER	
POSZ LAW GROUP, PLC 12040 SOUTH LAKES DRIVE SUITE 101 RESTON, VA 20191			PERKINS, PAMELA E	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 08/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/824,497

Applicant(s)ENDOU ET AL. **Examiner**

Pamela E. Perkins

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/15/04, 5/5/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the filing of the application papers on 15 April 2004. Claims 1-7 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanimoto et al. (6,833,562/JP2003-243654) in view of Tischler (5,442,200).

Tanimoto et al. disclose a method of manufacturing a silicon carbide semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate formed from a silicon carbide where a metal film (8) is formed in the contact hole (6) and on the insulating film (5) of the semiconductor substrate (1); and chemically combining the metal film (8) formed in the contact hole with a surface of the semiconductor substrate (1) below the contact hole (6) by subjecting the semiconductor substrate (1) to a heat treatment (fig. 4; col. 3, lines 3-51; col. 10, lines 11-31). Tanimoto et al. do not disclose removing the metal film formed on the insulating film with an etching liquid for dissolving the metal.

Tischler discloses a method of manufacturing a silicon carbide semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor

Art Unit: 2822

substrate formed from a silicon carbide where a metal film (25) is formed in the contact hole and on the insulating film (24) of the semiconductor substrate (21); subjecting the semiconductor substrate (21) to a heat treatment; and removing the metal film (25) formed on the insulating film (24) with an etching liquid for dissolving the metal (Fig. 2A-2D; col. 9, lines 47-68).

Since Tanimoto et al. and Tischler are both from the same field of endeavor, a method of manufacturing a silicon carbide semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate formed from a silicon carbide, the purpose disclosed by Tischler would have been recognized in the pertinent art of Tanimoto et al. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanimoto et al. by removing the metal film formed on the insulating film with an etching liquid for dissolving the metal as taught by Tischler to create a contact useful in high temperature, high power devices (col. 5, lines 24-42).

Referring to claim 2, Tanimoto et al. disclose forming of the metal film of a nickel single body (col. 10, lines 7-10).

Referring to claim 3, Tanimoto et al. disclose an etching liquid comprising phosphoric acid (col. 15, lines 10-15).

Referring to claim 5, Tischler discloses etching an upper surface of the insulating film after the removing of the metal film formed on the insulating film with etching liquid for dissolving the metal (col. 9, lines 65-68).

Referring to claims 6 and 7, Tanimoto et al. disclose the chemically combining of the metal film formed in the contact hole with the surface of the semiconductor substrate comprises subjecting the semiconductor substrate to a heat treatment of 900 °C or more (col. 13, lines 49-67).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanimoto et al. in view of Tischler as applied to claim 1 above, and further in view of Zenke (6,020,248).

Tanimoto et al. in view of Tischler disclose the subject matter claimed above except the etching liquid comprises a mixture liquid of sulfuric acid and hydrogen peroxide solution.

Zenke discloses a method of manufacturing a semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate where a metal film (12c) is formed in the contact hole (12b) and on the insulating film (12a) of the semiconductor substrate (10); subjecting the semiconductor substrate (10) to a heat treatment; and removing the metal film (12e) formed on the insulating film (12a) with an etching liquid for dissolving the metal (Fig. 2A-2E; col. 4, line 44 thru col. 5, line 21). Zenke further discloses the etching liquid comprises a mixture liquid of sulfuric acid and hydrogen peroxide solution (col. 11, lines 2-27).

Since Tanimoto et al. and Zenke are both from the same field of endeavor, a method of manufacturing a semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate, the purpose disclosed by Zenke would have been recognized in the pertinent art of Tanimoto et al. Therefore, it would

Art Unit: 2822

have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tanimoto et al. by the etching liquid comprising a mixture liquid of sulfuric acid and hydrogen peroxide solution as taught by Zenke to create a barrier (col. 10, lines 42-48).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E. Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PEP



Michael Trinh
Primary Examiner
Act SPE